ATOMIC ENERGY Letter

THE FIRST AND ONLY ATOMIC ... ADVICE

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Dear Sir:

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Manufacturers of nucleonic products will be among those exhibiting at the Grand Central Palace (New York City) show to be held by the Institute of Radio Engineers March 19-22 in conjunction with the annual meeting of the Institute: Amperex Electronic Corp., Brooklyn, N. Y.; Anton Electronic Labs., Inc., Brooklyn; Atomic Instrument Co., Boston; General Precision Lab., Inc., Pleasantville, N.Y.; Nuclear Instrument and Chemical Corp., Chicago, Ill.; and Victoreen Instrument Co., Cleveland, Ohio.

The increased need for high purity zirconium metal for the nuclear reactor development program now requires more U.S. producers, the USAEC has stated. Consequently, the USAEC will make available to private producers technological information (including classified data) on the unit processes involved in producing this metal. These unit processes are, roughly, (1) Separation of hafnium from the crude zirconium tetrachloride, (2) Chemical purification of the separated zirconium, (3) Calcination and rechlorination of the purified zirconium, (4) Reduction of purified tetrachloride using the basic Kroll-type process, (5) Refining of the reduced metal, using the basic de Boer-type process. At the present time, zirconium metal meeting USAEC-set chemical and physical specifications is being produced largely in Government-owned or controlled facilities, using processes developed by the Bureau of Mines and contractors of the USAEC. Manufacturers interested in the USAEC zirconium purchase program should write the USAEC's Division of Engineering, Washington 25, D. C.

Marking a step in increasing zirconium output (as above), a pilot plant for zirconium reduction will be built by the USAEC at Huntington, W. Va. It will be on a site adjacent to the present International Nickel plant at Huntington. Under the contract negotiated with International Nickel by the USAEC, the company will operate under lease the government-owned plant. The firm will also handle design of the new facility. Construction, including process equipment, is expected to cost more than two million dollars. Rust Engineering Co., of Pittsburgh, has been awarded a contract to handle construction of the plant.

David E. Lilienthal, former USAEC Chairman, has now said that further work on the hydrogen bomb is a waste, and that he seriously questions further work on it; he made this assertion in a Collier's magazine article. He said the waste is in money, in uranium, and in the country's best scientific manpower. He joined those who have questioned the military value of the hydrogen bomb, even if it is successful, and claimed that the destructive power of the atomic bombs now being produced is so great that it is hard to find worthwhile targets. Lilienthal urged concentration on the development of smaller atomic weapons. (Lilienthal resigned from the USAEC shortly after it was reported that he opposed the project before it started.)

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NEW PRODUCTS, PROCESSES & INSTRUMENTS...for nuclear work...

FROM THE MANUFACTURERS- Model SU-10 "Radiac" is an all-purpose ionization chamber type survey instrument, said to be most suitable for detection and measurement of gamma radiation for civil and industrial protection, radiological monitoring teams, or for laboratory purposes. Five full scale ranges of 5,50 and 500 mr/hr; and 5 and 10 r/hr. Two checks on performance of instrument are provided: (1) a built-in source of radioactivity (normally shielded) may be turned by a panel knob to face the ionization chamber and deflect the meter, and (2) the meter may be connected to the batteries, so that they can be checked. The instrument is said to have an overall accuracy of plus or minus 15% of indicated radiation dosage anywhere on the scale. Manufacturer states submersion proof, "shockproof", and operable under 0-100% humidity, with temperature range from minus 10 degrees F., to 125 degrees F. --Tracerlab, Inc., Boston 10, Mass.

Stainless steel Geiger-Mueller tubes, for special applications. (Each tube has wall thickness of 30 mg/sq. cm.) Model TGC-10A beta gamma area monitor tube is for obtaining a sensitive background count over a large area. As a dip counter, it may be used for continuous monitoring of municipal or other water supplies.....Model TGC-11A beta gamma "wrap-around" tube is designed for measurement of radioactive material which has been collected on large pieces of material such as filter paper. Suggested for use in conjunction with special air or water filters. Tube is supplied with a stainless steel cylinder which fits around the tube to provide an annular space about ¼" wide between the tube and the sleeve to guide and hold the filter paper.--Tracerlab, Inc., Boston 10, Mass.

High density alloy, Fansteel 77 Metal, is said to be strong and machinable, and to have a density of 16.7 gm./cc. (This compares with 11.3 for lead, and 19.3 for gold.) Available as finished or semi-finished parts, bar, rod, rings, discs, slabs, or special shapes. Recommended for radiation shields against X-ray and gamma radiation.---Fansteel Metallurgical Corp., North Chicago, Ill.

RAW MATERIALS... radioactive ores & other materials for nuclear work...

UNITED STATES- A new bonus and new prices have been set by the USAEC for Colorado Plateau uranium ores. Effective from March 1st, of this year, until March 1st, 1954, the USAEC will pay a new graduated bonus of up to $35,000.00, depending upon the quantity and grade of ore, for initial production and delivery of acceptable uranium ore from new and existing mining properties. For this same period, too, the USAEC will increase its guaranteed minimum base prices for the uranium oxide contents of carnotite-roscoelite type ores of the Colorado Plateau from its present range of 50¢-$2.00 per pound to $1.50-$3.50, depending upon the ore.

Since April, 1948, the USAEC has offered a $10,000.00 bonus (which no one has to-date collected) for the discovery of a new deposit and the production from it of the first 20 short tons of uranium ore or mechanical concentrate assaying 20% or more uranium oxide. The new bonus is in addition to, and does not supersede, this old one.

The new bonus differs from the old one in several respects: (1) The old bonus applied only to ores or mechanical concentrates assaying 20% or more uranium oxide. The new one provides for payments for ores containing as low as 1/10 of 1% uranium oxide, and for maximum payments for ores assaying as low as 2/10 of 1%. (2) The old bonus is to be paid only after 20 short tons of ore are delivered. Under the one, payments will be made on each pound of uranium oxide sold in acceptable ores up to and including the first 10,000-pounds (3) The new bonus applies to carnotite-roscoelite ores of the Colorado Plateau; the old one does not.

This bonus is described in the USAEC domestic uranium program circular No. 6 entitled "Bonus for Initial Production of Uranium Ore from Domestic Mining Properties." Copies of the circular may be obtained from the USAEC's Raw Materials Operations Office, Washington 25, D. C.

Grand Junction, Colo.- According to the USAEC's regional office here, drilling, as part of the uranium exploratory program, has now started in Utah's San Juan county. The work is west of Blanding, and the USAEC said it plans to drill in the neighborhood of 100,000-feet of core tests. Although there have been previous tests which looked promising in the same area in the past two years, the new coring will not be in established deposits, but will be for the purpose of locating new ones, the USAEC stated.

AT THE ATOMIC CITIES & CENTERS IN THE UNITED STATES...

LOS ALAMOS, New Mexico- The ZIA Company, doing maintenance and other services for the technical area and Los Alamos community, is to receive a fee for its 1951 fiscal year work not to exceed $90,000.00. The ZIA contract, signed in 1948, provided that an annual fee would be negotiated each fiscal year, prior to June 30. (The contract was for a three-year period, and ZIA and the USAEC are now negotiating an extension of it.) The contract included the usual government provisions for cost-plus-fixed-fee operations, with the fee to be determined by various factors, largely the scope of the work to be performed. Under this procedure, ZIA's fee for 1948 work exceeded $200,000.00. For fiscal 1950 it was reduced to $154, 310.00, while the fee negotiated for fiscal 1951 was set at $131, 014.00. As a result of Congressional action, a ceiling was placed on such fees of $90,000.00 annually; this will now prevail. (ZIA is a management and community operating organization, wholly-owned by the McKee's, who early dominated the construction activity at Los Alamos. They were one of the firms which a Congressional appropriations committee called a "favorite" of the USAEC, during hearings which resulted in the ceiling being placed on fees payable to management firms at the USAEC's "company" towns.)

As a direct result of a Washington investigation of the protective, or security force here, a shifting of Los Alamos top-drawer security executives has now taken place. John A. Carroll, chief of the Los Alamos protective force section since 1947, has now "resigned". Other personnel changes were also made, as well as a major administrative change which now places Los Alamos security responsibilities with the Santa Fe Operations Office.

A medical research laboratory to be erected here will provide facilities for the bio-medical research and the industrial health research activities of the laboratory's health division. Its cost has been estimated at between $1,500,000.00 and $1,800,000.00. Bids will be available to suppliers from the USAEC's contract division here; closing date is April 24th.

OAK RIDGE, Tennessee- In a discussion of the nuclear reactor as a practical power source, William B. Seaver, of the Nuclear Energy for Propulsion of Aircraft project, at Oak Ridge, told a group at Vanderbilt University recently of major problems encountered by the project. There is stability, speed of control, the extremely high temperatures involved, and the necessity for adequate shielding of the highly radioactive materials employed, Seaver explained. The necessity of designing to close tolerances is a particularly ticklish problem where a nuclear power plant is concerned, Seaver said. He observed, however, that the end result that counts is still "how much thrust can be produced by this power plant, and how much does it weigh?"

A course, for professional research workers who will direct research employing autoradiographic techniques, will be given in the theory and techniques of auto-radiography, by the Oak Ridge Institute of Nuclear Studies this Summer. The course, which will begin July 2nd, and continue for from three to four weeks, will include (1) theory of the photographic process, (2) reaction of ionizing particles with photographic emulsions and the interpretation of results, and (3) techniques of making gross and microscopic autoradiograms. Additional information and applications may be obtained from the Institute, at P. O. Box 117, Oak Ridge, Tenn.

ATOMIC PATENT DIGEST... latest U. S. applications & grants...

Preparation of diborane, by reacting a borohydride of an alkali metal and a boron halide. Also: A process of preparing diborane which comprises subjecting an alkaline earth metal alkoxy borohydride to the action of boron halide. U.S. Pat. No. 2,543,511, issued Feb. 27, 1951; assigned to United States of America (USAEC).

Method and apparatus for neutron well logging. A method of producing a well log that emphasizes a particular chemical element existing in certain of the formations penetrated by a well. The method comprises irradiating the formation adjacent to the well with fast neutrons, and detecting neutrons which return to the well by producing proportionately related electrical signals, U.S. Patent 2,543,676, issued Feb. 27, 1951; assigned to Well Surveys, Inc., Tulsa, Okla.

IONIZING RADIATION...investigations & industrial reports...

INVESTIGATIONS- In a study of the effect of the variation in dosage rate of roentgen rays on survival in young birds, in work done by S. Phyllis Stearner, Biology Division, Argonne National Laboratory, Chicago, it was found that such survival depended on total dose, dose rate at which the exposure was made, and age at time of exposure. Exposure of 2 to 3 day chicks to 1,000 r at a rate of 15 r/minute or more resulted in 75% mortality within 24 hours. Exposure to the same dose at 6r/minute resulted in only 1% mortality within 24-hours, with 46% occurring between 5 and 10 days after irradiation. When one week chicks were exposed to the same dose, the largest number of deaths occurred during the first 24-hours, whether the rate was 6 r or 43 r/minute. Two to three day ducklings showed the same reaction to irradiation as was seen in chicks, suggesting that the dose rate effect on survival may be characteristic of the entire avian class. The experimenter notes that the mechanisms leading to the early death are not clearly understood. She suggests that the biologic effects of variation in dose rate indicates recovery is taking place during an exposure at the low rate, so that the total effect of the dose is less than if it were given at a high rate.

Further work done by Stearner (above), with Emily J. B. Christian, of Argonne, was to determine the effect of over-all time of exposure upon survival of young chicks following roentgen irradiation. Indications here were that over-all time is of greater importance than dosage rate in determining the lethality of a given dosage for newly hatched chicks. Survival following continuous or fractionated dosages, at an average rate of 11.5 r/minute, resembled that which followed low rate exposures, while survival after continuous or fractionated dosages, at an average rate of 18.5r/minute, was characteristic of that seen after continuous exposure at 43 r/minute.

INDUSTRIAL REPORTS- Sterilization of foods by X-ray or cathode ray treatment has shown definite promise, B. E. Proctor, M. I. T., recently told a technical session of the National Canners' Association, meeting in convention in Chicago. With an early model Van de Graaff machine, Proctor and his group found that cathode rays at a potential of 3-million volts would destroy all bacteria in any food medium, and in any container, provided that the total thickness of the material treated was kept within a limit of about 0.5 -inch. Higher voltages will allow satisfactory sterilization of thicker specimens, Proctor said. Advantages Proctor cited for such cathode ray treatments are the absence of deleterious effects on vitamins in natural foods and the speed with which sterilization is accomplished. Cathode rays effected sterilization in a few seconds, in samples which required 8 to 12 minutes treatment with X-rays for the same results. A possible disadvantage may be the difficulty of inactivating enzymes by cathode ray treatment. For complete inactivation, some enzymes which cause changes in processed foods require radiation dosages up to 20 times those necessary for 100% kill of bacteria. Proctor felt that better methods than radiation might be found for inactivation of enzymes, without detracting from the utility of radiation as a batericidal agent.

Problems sanitary engineers face in radioactive waste disposal were recently outlined to the Purdue Sixth Industrial Waste Conference, West Lafayette, Ind., by A. E. Gorman, USAEC sanitary engineer. Wastes from atomic energy installations may be toxic, or radioactive, or both, and require special equipment and techniques in addition to all the standard procedures in general use. In the treatment of radioactive wastes, Gorman stated, practical advantage is taken of the fixation property of radioactive materials--a phenomenon evidenced in the attachment of these materials to particles or surfaces. Work is currently in progress to determine the degree of permanence of such attachments, and to improve the efficiency of filters for use at higher temperatures, and in the presence of moisture. Gorman said that filters have proved to be the most efficient means of trapping radioactive materials to date. So important is the problem of ultimate disposal of radioactive wastes, Gorman stated, that this is a prime consideration in the selection of sites for atomic energy facilities.

ATOMIC ENERGY: ITS ROLE IN THE WORLD ECONOMY. A special digest, for readers of this LETTER. (From a speech by USAEC chairman Gordon Dean, at Northwestern University, Feb. 28th, 1951.)

Atomic energy, unlike other epochal forces, first found its application in a military way; unlike other forces, it is being developed in secret and by the Government. It has been isolated from normal economic forces because its military application is still its dominating characteristic; it may remain so isolated for some time.

However, the USAEC has long-range objectives which, if and when achieved, may have a solid impact upon the peacetime economy here and abroad. Today, the role of atomic energy in the U. S.'s economy is more negative than positive. The atomic energy program is taking more out of the country's wealth and resources than it is putting in. While ultimately the atom may produce power, the fact remains that the atomic energy program today is now the U. S.'s largest single consumer of power.

To understand the general nature of the atomic energy program, and the factors which determine its magnitude, visualize a pyramid. The base of this pyramid is composed of raw material ore. Upward, at succeeding levels, are the great feed materials processing plants, uranium separation plants, plutonium-producing reactors, research and development laboratories, and weapons facilities and testing areas. At the peak are the end products--atomic weapons, isotopes, and technological information of infinite value to tomorrow's economy.

The ultimate size of this pyramid--which is the atomic energy program--is determined by ore. (There are, of course, other limiting factors: trained manpower, critical metals, etc.) Uranium, then, is crucial. (How big is this whole pyramid? Well, to-date, Congress has appropriated more than 6 billions of dollars for atomic energy in the U. S. Two, of these 6 billions, were appropriated during the current fiscal year--a sum comparable to the entire amount spent on atomic energy by the Manhattan Engineering District during World War II. In the personnel field alone it has been estimated that 5% of the total scientific and engineering population of the U.S. is engaged in atomic energy work.)

With uranium so crucial, it is of interest that significant concentrations occur very sparingly. However, we now mine some deposits containing but 1 part uranium oxide to each 1,000 parts of ore. It is the richer yields, though, that give the great bulk of the U.S.'s supply--the Congo, Canada, and Colorado.

Concerning the program underway on uranium ores: First, we want to find high-grade deposits. Second, we are turning increasingly to lower-grade deposits. The most obvious of these are deposits where uranium can be had as a by-product of the production of some other valuable mineral; an example are the gold ores of the Union of South Africa, where the tailings yield small amounts of uranium. Third, we hope to produce economic methods for extracting uranium form such very low-grade deposits as the phosphates. And fourth, the prices the USAEC will pay for uranium, and the bonus for production from new mines, have been increased. (Further details in "Raw Materials" section, this LETTER)

Using the figures of Schurr and Marschak ("Economic Aspects of Atomic Power"), one pound of uranium, fully consumed, would yield about 2½ million KWH of electric power, which is equivalent to approximately 1,250 tons of bituminous coal. The program of the USAEC in this field of obtaining electrical energy from nuclear fission includes: An experimental breeder reactor--to produce some useful power as a by-product; a submarine reactor, which will give us the first use of nuclear energy for propulsive purposes; and certain experimental reactors, such as the materials testing reactor, which will add to the knowledge of how to build future reactors.

Sincerely,

The Staff,
ATOMIC ENERGY NEWSLETTER

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